A STUDY TO EVALUATE THE EFFECTIVENESS OF BUERGER-ALLEN EXERCISE IN IMPROVING PERIPHERAL CIRCULATION AMONG DIABETES MELLITUS PATIENT IN SELECTED HOSPITAL AT KANYAKUMARI DISTRICT.

DISSERTATION SUBMITTED TO

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI

IN PARTIAL FULFILLMENT OF REQUIREMENT FOR THE

AWARD OF DEGREE OF MASTER OF

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Internal Examiner

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APRIL 201

CERTIFICATE

This is to certify that the dissertation entitled, "**A Study To Evaluate The Effectiveness Of Buerger-Allen Exercise In Improving The Peripheral Circulation Among Diabetes Patient In Selected Hospital At Kanyakumari District**" is a bonafide work done by **Mrs. A. Abishal, M.Sc, (N)** II Year, Global College of Nursing, Nattalam in partial fulfillment of the **Dr. M.G.R. Medical University** rules and regulations for the award of M.Sc (N) degree under my guidance and supervision during the academic year April 2016.

Place: Nattalam

Date:

Signature

Principal,

Global College of Nursing,

Nattalam.

DECLARATION

I hereby declare that the present dissertation titled **"A study to evaluate the effectiveness of Buerger-Allen exercise in improving peripheral circulation among diabetes mellitus patient in selected hospital at Kanyakumari district**" is the outcome of the original research work under taken and carried out by me under the guidance of **Mrs. Roselind Immanuel M.Sc (N),** Global college of Nursing Nattalam. I also declare that the material of this has not formed in any way, the basis for the award of any degree or diploma in this university or any universities.

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INVESTIGATOR

ABSTRACT

A study to evaluate the effectiveness of Buerger-Allen exercise in improving the peripheral circulation among diabetes mellitus patient in a selected hospital at kanyakumari district.

Objectives:

- To assess the pre test and post test level of peripheral circulation among diabetes mellitus patient in experimental and control group.
- To compare the post test level of peripheral circulation among diabetes mellitus patient between experimental and control group.
- To associate the pre test level of peripheral circulation among diabetes mellitus patient in experimental group with their selected demographic variables.

Findings of the study

The Quasi experimental pre and post test control group design was adopted and the selected from Dominic, hospital in kulasekharam chosen for the study. The sample size was 60 and was drawn through purposive sampling technique. The level of peripheral circulation assessed by using modified 60 seconds diabetes foot screen scale.

Buerger-Allen exercise was applied for experimental group. Post test done after intervention period, and analyzed by The data gathered were analyzed by

descriptive and inferential statistical method and interpretations were made on the basis of the objectives of the study.

During posttest, in Experimental group of left leg and right leg 0(0.00%),0(0.00%) had Good blood circulation, 10(33.33%),12(40.00%) had slightly poor blood circulation,20(66.67%),18(60.00%) had Poor blood circulation, 0(0.00%),0(0.00%) had Very Poor blood circulation respectively.

It revealed that among experimental group diabetes mellitus patient in the mean score of left leg right leg was 16.56 and 17.06 in pre test, 13.33 and13.00 in post test. The paired 't' value was 9.35 and12.51* which is significant at p >0.05respectively.

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CHAPTER - I

INTRODUCTION

BACKGROUND OF THE STUDY

"Prevent diabetes: protect our future"

(WHO)

Diabetes mellitus is a group of metabolic diseases in which a person has high blood sugar, either because the pancreas does not produce enough Insulin, or because cells do not respond to the insulin that is produced. This high blood sugar produces the classical symptoms of polyuria, polydipsia and polyphagia.

Diabetes mellitus type 2 (formerly non insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency. Diabetes mellitus type I, in which there is an absolute insulin deficiency due to destruction of islet cells in the pancreas. Type 2 diabetes makes up about 90% of cases of diabetes with the other 10% due primarily to diabetes mellitus type I and gestational diabetes. Obesity is thought to be the primary cause of type 2 diabetes in people who are genetically predisposed to the disease. **Chyong-Fang Chang (2015**).

Rates of diabetes have increased markedly over the last 50 years in parallel with obesity. As of 2010 there are approximately 285 million people with the disease compared to around 30 million in 1985. C**hang-cheng chang (2015).**

As of 2014 an estimated 387 million people have diabetes worldwide, with type 2 diabetes making about 90% of the cases, this is equal to 8.3% of the adult population with equal rates in both women and men. In the year 2012 -2014 diabetes is estimated to have resulted in 1.5 - 4.9 million deaths per year. Diabetes mellitus commonly referred to as diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. **Mei-yen chen (2015)**

As per the report of **International Diabetes Federation** (**IDF**), India is looming epidemic of diabetes, and known as the diabetes capital of the world. According to IDF, India has highest number of 50.8million people suffering from Diabetes Mellitus (DM), followed by China (43.2million) and US (26.8 million). The report projected 58.7million DM case in India by the year of 2010- almost 7% of the adult population in the developing countries. More over 3.2 million deaths are due to DM. In Tamil Nadu 22-26 % people are suffering with diabetes mellitus.

Exercise training for prevention of decreased peripheral circulation among diabetic patient helps in potential mechanisms like formation of collateral circulation and increased blood flow, changes micro circulation and endothelial functions, changes in muscle metabolism and oxygen extraction, prevention inflammation and muscle injury, cost effective, preventing atherosclerosis and prothrombotic risk factors. Buerger- Allen exercise has shown an effect on improving peripheral circulation. Buerger- Allen exercise is an active postural exercise in which gravity alternatively fills and empties the blood vessels for preventing Peripheral vascular diseases (PVD) and promoting peripheral circulation in lower extremities.

NEED FOR THE STUDY

The diabetes mellitus is a group of metabolic disorder characterized by hyperglycemia and microvascular, macrovascular and neuropathic complications. Type 2 DM is the commonest form of diabetes constituting 90% the diabetes population. The acute and chronic complications of diabetes is the major cause of hospital admission. The prevalence of micro and macro vascular complications is more in Asian are 66.4% and it is 44.2% more than European populations.

According to the **World Health Organization (WHO)** report, India today bends the world with or 32 million diabetic patients and this number *is* projected to increase to 79.4 million by the year 2030. Recent surveys indicate that diabetes now affects a staggering 10-16%of urban population and (5-8%) of rural population in India .Tamil Nadu accounts for nearly 11 per cent of the total number of Type 2 diabetes in the country and the number is really huge in the North Tamil Nadu region. Though the concentration is on different parts of the State, primary stress is on the North Tamil Nadu region, where the incidence of Type 2 diabetes is rapidly increasing and healthcare facility is way behind Bangalore and surrounding areas. The most recent statistics from the state Health Ministry shows that the lifestyle diseases are rampant in the Bangalore city, with 14 percent suffering from diabetes out of a population of 8.8 million.

As per the "**Healthy People Program**" prevention of problems of diabetic foot are the major goal. Peripheral neuropathy contributes to diabetic foot

complications and the possibility of ulceration of lower extremities in the diabetic patients is approximately 15-59times more than in the non diabetic individuals. Around 45-70% of diabetic traumatic amputations results from diabetic peripheral neuropathy.

In South India it was found that patients without diabetic foot problems spent 9.3% of total annual income, while patients with diabetic foot problem had to spend 32.3% of the total income towards the treatment. Approximately 15%of the people with diabetes develop one diabetic foot ulcer associated with peripheral neuropathy. (**India's diabetes burden**)

Buerger- Allen exercises an active postural exercise (gravity alternatively fills and empties the blood vessels) for presenting PVD) and promoting peripheral circulation in lower extremities. Approximately 15 -40 % people with PVD is having diminished ability for performing daily activities A Study was conducted among 14 patients showing that the subcutaneous blood flow is increase in seven patients temporarily within 24 hour by doing Buerger- Allen exercise.

K.BJerre - Jepsen (2004) showed that Buerger-Allen exercise improved the peripheral circulation of lower extremity, Individuals with diabetes mellitus have a two to fourfold increase in the rate of peripheral arterial disease. Peripheral arterial disease is a slow and progressive disease with systemic atherosclerosis. Purpose of the study is to investigate the level of lower extremity perfusion among patient with type 2 diabetes and assess the effect of Buerger Allen Exercise to improve lower extremity perfusion among patients with type 2 Diabetes Mellitus admitted at tertiary hospital, India. Non equivalent pre test post test control group design was followed to conduct the present study; divided 60 patients with type 2 diabetes mellitus admitted in

Chettinad Hospital and research institute were grouped in to two groups. Subjects in experimental group were undergone intervention of Buerger - Allen exercise under supervision for 2 times a day for 5 days and in control group, subjects were under regular treatment. Demographic data and ankle brachial index scale was used to assess the lower extremity blood circulation. In experimental and control group 24(80%), 15 (50%) had lower extremity arterial disease and 6(20%), 15 (50%) were in border line. In experimental group there was a significant difference between the pre-test mean value 0.922 with SD 0.0562 and post test mean value 0.980 with SD . 0407 which projects that t value 9.108* was significant at the level of $p<0.05$. The findings of the present study revealed that here is a significant improvement in the lower extremity perfusion after doing Buerger-Allen exercise. Buerger Allen exercise was found to be effective on improving the peripheral circulation of lower extremity among patients with type 2 diabetes mellitus.

Priyankha Jayakumar (2013) was conducted a cross sectional study was conducted on the prevalence and awareness of peripheral neuropathy and perception of diabetic foot problems among 67 type 2 diabetic patients at a tertiary care hospital at Bangalore. The study results revealed that the prevalence of peripheral neuropathy was 64.1% in the Study group, of which only 15.8% had adequate knowledge about peripheral neuropathy and it is prevention. The study concluded that there is a need for educating the people with diabetes regarding early assessment of peripheral neuropathy and must be motivated to perform the clinical assessment annually on physician's consultation.

The investigator's family many of them were affected with diabetes mellitus with numbness, tingling, erythema and edema in lower extremities. So the

investigator was interested to improve the peripheral circulation without any medication. After the investigator got information about Buerger-Allen exercise from journals and tried it. The investigator found the Buerger-Allen exercise to be effective. Hence investigator selected this study for improving the peripheral circulation among diabetes mellitus patient.

STATEMENT OF THE PROBLEM

"A study to evaluate effectiveness of Burger - Allen exercise in improving the peripheral circulation among diabetes mellitus patient in selected hospital at Kanyakumari district".

OBJECTIVES

- To assess the pre test and post test level of peripheral circulation among diabetes mellitus patient in experimental and control group.
- To compare the post test level of peripheral circulation among diabetes mellitus patient between experimental and control group.
- To associate the pre test level of peripheral circulation among diabetes mellitus patient in experimental group with their selected demographic variables.

HYPOTHESIS

- H_1- there will be significant difference in pre test and post test level of peripheral circulation among diabetes mellitus patient in the experimental and control group.

- H_2 -there will be significant association between pretest level of peripheral circulation among diabetes mellitus patient with their selected demographic variables.

OPERATIONAL DEFINITION

Evaluate

To judge or determine the significance, worth, quality or form an idea.

In this study, evaluate is to determine the outcome of Buerger-Allen exercise to improve the peripheral circulation among diabetes mellitus patient.

Effectiveness

The ability to produce specific result or to exert a specific measurable influence.

It refers to the improvement of peripheral circulation among the experimental group and control group after administering Buerger-Allen exercise. It is assessed by modified 60 seconds foot screen tool.

Buerger-Allen Exercise

Buerger- Allen exercise is an active postural exercise, which help in filling and empting the lower extremity blood vessels according to gravity alternatives.

In this study it refers to three steps of active postural exercise that includes elevation, dependency, horizontal, which improves the peripheral

circulations of the lower extremities among diabetes patients for about 12-13 minutes and four times a day.

Improving Peripheral Circulation

It refers to the increased blood circulation of the lower extremities after administering the Buerger-Allen exercise.

Diabetes Mellitus

Diabetes mellitus commonly referred to as diabetes, is a group of metabolic diseases in which there is high blood sugar levels over a prolonged period.

In this study it is a group of metabolic disease with increased blood sugar and associated with erythema, numbness, tingling and edema.

ASSUMPTIONS

The study assumes that Buerger-Allen exercise

- improves peripheral circulation among diabetes mellitus patients.
- reduces the signs and symptoms of erythema, numbness, tingling and edema.
- has no adverse effect.

DELIMITATIONS

The study is delimited to

• four weeks.

• 30 samples in each experimental and control group.

• the patients with 50 years of age and above.

• those who are willing to participate.

ETHICAL CONSIDERATION

The study was conducted after the approval from research and ethical clearance committee of Global college of nursing, Formal written approval from Dean of Dominic hospital and oral consent was obtained from each samples.

CONCEPTUAL FRAME WORK

"Based on general system theory"

Conceptual framework is a whole of interrelated concepts or abstracts that are assembled together in some rational scheme by virtue of their relevance to common theme. A conceptual model provides for logical thinking for systemic observation and interpretation of observed data. The model also gives direction for relevant questions on phenomena and points out solutions to practical problems as well as serves as a spring board for the generation of hypothesis to be used.

Shirly 1975 states,"the conceptual frame work formalizes the thinking process. So that others may read and know the frame of reference basis to research problem".

The conceptual framework which suits the present study is based on **General System Theory of Von Ludwig Bertalanffy (1968).**

According to Von Ludwig Bertanlanffy, a system is composed of a set of interactive elements and gets each system distinct from environment in which it exits. In all systems activities can be resolved into an aggregation of feedback circuits such as input, throughput and output. The feedback circuits helps in maintenance of an intact system.

Present study aims at evaluating the effectiveness of Buerger- Allen exercise in improving the peripheral circulation among diabetes mellitus patient. Conceptual

framework of this study is based on the system model. The model consists of three phase.

1. Input

It is the energy transformed by the system. It refers to the target groups with their character such as age, gender, educational status, food pattern, type of activity and duration of illness and the assessment of pre-test level of peripheral circulation in experimental group and control group.

2. **Throughput**

It is a process that occurs at some point between the input and output process, which enables the input to be transferred as output in such a way that it can be readily used by the system.

According to Von Ludwig Bertanlanffy throughput is defined as the process by which the system processes output and release output.
In this study the throughput refers to Buerger-Allen exercise among selected diabetes mellitus patient in experimental group.

3. Output

According to the system theory, output refers to the energy, matter, or information that leaves the system. In the present study, output is considered as the evaluation of Buerger-Allen exercise among diabetes mellitus patients. It will be received in the form of post test level of peripheral circulation in experimental group and control group through 60seconds diabetes foot screen tool.

4. Feedback

According to this system theory feedback refers to the output that is returned to the system and it allows it to monitor itself overtime to a steady state known as equilibrium or homeostasis.

For the present study feedback was related to evaluate the effectiveness of Buerger-Allen exercise among selected diabetes mellitus patients will be obtained by testing of hypotheses-Relationship between pre test and post test level of peripheral circulation among selected diabetes patients through60seconds diabetes foot screen tool and Association between pre test levels of peripheral circulation among selected diabetes patients with the selected demographic variables such as age, gender, educational status, food pattern, type of activity and duration of illness.

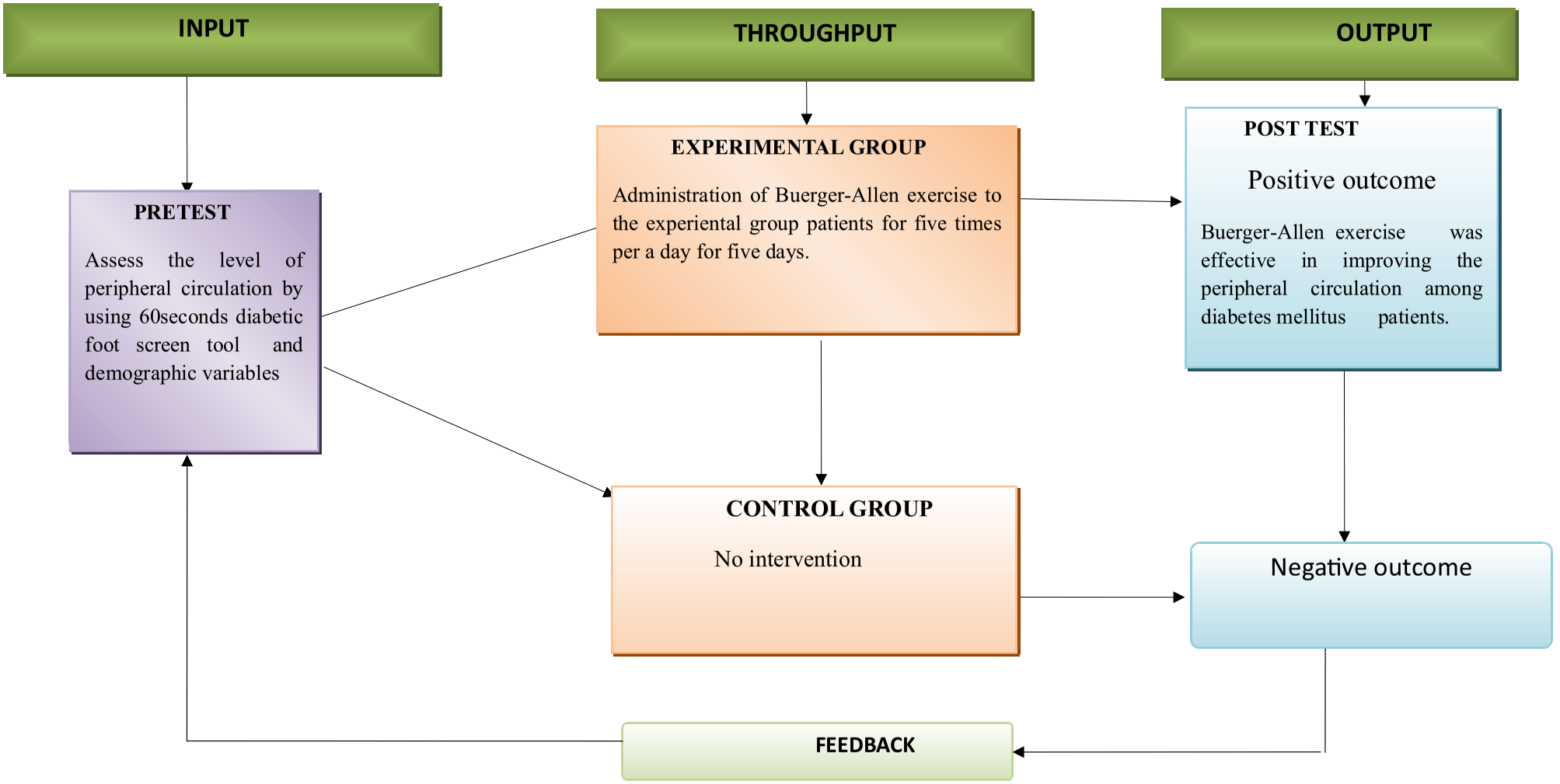


Figure 1.1: **Conceptual frame work based on launching Von Ludwing Bertanlanffy (1968) and Kenny general system theory.**

CHAPTER - II

REVIEW OF LITERATURE

Review of literature is the reading and organizing of previously written materials relevant to specific problem to be investigated frame work and methods appropriate to perform the study.

The literature has been organized under following headings,

- Studies related to incidence and prevalence of diabetes mellitus.
- Studies related to Diabetes Mellitus and its complications.
- Studies related to Effectiveness of Buerger - Allen exercise.

STUDIES RELATED TO INCIDENCE AND PREVALENCE OF DIABETES MELLITUS

The Chennai Urban Rural Epidemiology Study (CURES) (2011) has conducted a large cross-sectional study carried out in Chennai, the largest city in Southern India, with a population of about 7 million people. The sampling for CURES was based on the model of systematic random sampling, wherein from the 155 wards, 46 were selected from which 26,001 individuals were selected to represent all the 10 corporation zones of Chennai. The data from CURES was used to develop The Indian Diabetes Risk Score (IDRS). The IDRS was developed using four simple parameters, namely age, family history of diabetes, waist circumference and physical activity based on a multiple logistic regression model used to help identify undiagnosed diabetes in the community as described elsewhere. Subjects with an IDRS value of < 30 were categorized as low risk, those between 30 and 50 as medium risk and those with ≥ 60 as high risk for diabetes. Receiver Operating Curves (ROC) was constructed to identify the optimum value (≥60%) of IDRS for determining

diabetes as diagnosed using WHO Consulting Group Criteria. The study concluded that an IDRS value ≥60 had the optimum sensitivity (72.5%) and specificity (60.1%) for determining undiagnosed diabetes in the community with a positive predictive value of 17.0%, negative predictive value of 95.1%, and accuracy of 61.3%.

Edurne Alonso – Moran (2007 – 2011) has conducted Type 2 diabetes mellitus is associated with a diverse range of pathologies. The aim of the study was to determine the incidence of diabetes-related complications, the prevalence of coexistent chronic conditions and to report multimorbidity in people with type 2 diabetes living in the Basque Country. The study was concluded that was observed that the incidence of diabetes-related complications has declined over the past four years. The study concluded that number of major amputations performed (-23.8%) and the number of acute myocardial infarctions (-13.6%) have decreased, among others.

"India's diabetes burden to cross 100 million by 2030" (2010) has published in times of India states that the global diabetes numbers are out, and it's not looking too good for India. India is home to over 61 million diabetic patients - an increase from 50.8 million last year. By 2030, India's diabetes burden is expected to cross the 100 million mark as against 87 million earlier estimated. The country is also the largest contributor to regional mortality with 983, 000 deaths caused due to diabetes this year. The International Diabetes Federation's (IDF) has concluded the total number of people with diabetes this year reached a staggering 366 million with 4.6 million deaths. Healthcare spending on diabetes has reached $465 billion. New figures indicate that the number of people living with diabetes is expected to rise from 366 million this year to 552 million by 2030, if no action is taken. This equates to approximately three new cases every 10 seconds or almost 10 million per year."This

year, South Asia accounted for 71.4 million diabetics. This number is expected to increase to 120.9 million by 2030. The study concluded that 36.2 million are still yet to be diagnosed with the disease. The region has one of the highest estimates of prevalence of type 1 diabetes in children. While, 183 million (50%) with diabetes were undiagnosed this year.

Khalid A. Alqurashi, Khalid S. Aljabri, and Samia A. Bokhari (2009) has conducted A cross-sectional study among patients attending a primary care clinic in June 2009.Diabetes mellitus is the most common chronic endocrine disorder, affecting an estimated 5% to 10% of the adult population in industrialized Western countries, Asia, Africa, Central America and South America, and it has a large impact on society. The International Diabetes Federation (IDF) estimated that there were 151 million people with diabetes in 2000. Despite methodological differences, this was similar to the present estimate for a comparable population of 147 million. The IDF has subsequently released estimates of the numbers of people with diabetes for 2003 of 194 million and forecasts for 2025 of 334 million. The clinical characteristics of the diabetic population and their comorbidities have been obtained mainly from hospitals or community-based surveys. The study was concluded that the prevalence of diabetes is high among the Saudi population and represents a major clinical and public health problem.

"Modern Ways Open India's Doors to Diabetes"(2007) in New York Times states has conducted study according to International Diabetes Foundation, India has more diabetics than any other country in the world. Although more recent data suggest that China has even more. The disease affects more than 50 million Indians - 7.1% of the nation's adults - and kills about 1 million Indians a year. The

average age on onset is 42.5 years. The high incidence of diabetes is attributed to a combination of genetic susceptibility plus adoption of a high-calorie, low-activity lifestyle by India's growing middle class.

Indian Council of Medical Research-Indian Diabetes (ICMR - INDIAB), (1998) has conducted a national diabetes study, India currently has 62.4 million people with diabetes. This is set to increase to over 100 million by 2030. The majority of people with diabetes (>90%) have Type 2 diabetes. While T2DM predominantly affects older individuals in developed countries, in developing nations like India, it affects the younger. The Chennai Urban Population Study [CUPS] is one of the few longitudinal epidemiological studies on diabetes conducted in India till date. The baseline study was completed in 1996-97 and the follow-up was conducted after a mean period of eight years. The CUPS showed that subjects with IDRS score ≥60 at baseline also had the highest proportion of conversion to diabetes (27.8%) followed by those with medium risk score of IDRS (16.9%) and was lowest in those with low IDRS (<30), (5.6%, $P < 0.001$). Moreover, 38.4% of 'converters' to either diabetes or pre-diabetes had high IDRS scores at baseline. IDRS had the highest relative risk (RR) for predicting incident diabetes. Even after adjusting for age and gender, the RR for incident diabetes remained significant (IDRS ≥ 60: RR 3.1, $P = 0.035$, IDRS 30-50: RR 2.7, $P = 0.032$). The study concluded that a high IDRS can be useful to identify those who are likely to develop diabetes or pre-diabetes in the future, even if they have normal glucose tolerance now.

"Modern Ways Open India's Doors to Diabetes" (2002) in New York Times states that according to The International Diabetes Foundation, India has more diabetics than any other country in the world. Although more recent data suggest that China has even more. The disease affects more than 50 million Indians - 7.1% of the

nation's adults - and kills about 1 million Indians a year. The average age on onset is 42.5 years. The study concluded that the high incidence is attributed to a combination of genetic susceptibility plus adoption of a high-calorie, low-activity lifestyle by India's growing middle class.

STUDIES RELATED TO DIABETES MELLITUS AND IT'S COMPLICATIONS

C. Mason, H.J. Thomasetal (2011) has conducted cross sectional study has done on the prevalence of diabetic neuropathy in an urban South Indian population among 1629 diabetic patients attending the tertiary clinics. Samples of 1297 were known to have diabetes for the past 15 years and 332 were newly diagnosed diabetic patients. Neuropathy was diagnosed using biosthesiometry. The results of the study revealed that the overall prevalence of diabetic peripheral neuropathy was 26.1% among the known diabetic subjects. The study concluded that the overall prevalence of diabetic neuropathy was 26.1% and that it was associated with the age, glycated haemoglobin and duration of diabetes .

Cicoline G, (2009) has conducted cross sectional study has carried out in Bahrain, related to diabetic neuropathy, foot ulceration and peripheral vascular disease and potential risk factors among 1477 patients with diabetes. The results of the study showed that 36.6% of the study sample had diabetic neuropathy, 5.9% had foot ulceration and 11.8% had peripheral vascular disease. The study concluded that older adults, poor glycemic control, longer duration of diabetes, elevated cholesterol levels, current smoking, obesity, hypertension and elevated triglycerides were the risk factors and measures to be taken to prevent the associated risk factors and

implementation of strategies for prevention, early detection and appropriate treatment are needed.

Fabian B, (2007) has conducted study was done on the manifestations of peripheral neuropathy in newly diagnosed 100 type 2 diabetic patients attending the Regional Institute of Medical Science. The results of the study showed that 30 out of 100 patients had neuropathic signs ;impaired vibration sense which was the most common abnormality in 21 patients(70%) followed by pain ,loss of position and touch in 9 patients(30%) .The study concluded that identification of neuropathic signs must be done by health professionals to reduce the risk of amputation.

Dennis G, (2004) has conducted the study of association of limited joint mobility and plantar foot pressure in diabetic foot ulceration among 345 Asian Indian diabetic subjects attending the foot clinic. The study group were non diabetic controls (n=50), diabetic patients without neuropathy (n=100), diabetic neuropaths (n=110), and diabetic neuropaths with past history of foot ulceration (n=85). Joint mobility, plantar pressure and neuropathy status were measured. The study resulted that diabetic patients had higher prevalence of limited joint mobility and higher plantar pressure than control subjects .Among the diabetic patients, those with neuropathy and history of plantar ulceration had higher limited joint mobility and plantar pressure compared to non neuropaths. The study concluded that both limited joint movement and high plantar pressure appear to be important determinants of foot ulceration in susceptible neuropathic South Indian diabetic patients.

Marilyn M S, (2002) has conducted the longitudinal study has carried out on preventing complications in patients with diabetic peripheral neuropathy from 1994-2004. The objective of the study was to systematically review literature for the

evidence on the efficiency of the methods advocated for preventing complications in diabetic patients. The study reported that prevention of foot complications begins with screening for loss of protective sensation, in conjunction with other findings from history and physical examination which enables to determine the type of intervention to be used, educating patients about foot care and periodic foot examination, optimizing glycemic control; smoking cessation and intensive podiatric care are significant. The study concluded that screening of all patients with diabetes to identify at risk clients for diabetic peripheral neuropathy has to be carried out.

Sree Mookambika Institute of Medical Sciences has conducted a study on prevalence of asymptomatic Peripheral Arterial Disease (PAD) in diabetic women from southern India. They selected 100 type-2 diabetic women attending medical outpatient department in a rural tertiary care center (Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu, India). Those with pre-existing PAD, with symptoms suggesting PAD-like claudication, with established coronary artery disease, and smokers or tobacco chewers were excluded. All patients were already on treatment with oral anti-diabetic drugs with fair control. Patients taking insulin regimes were excluded for uniformity. Ankle Brachial Index (ABI) was measured using blood pressure apparatus and handheld Doppler equipment. Blood sugar and Hemoglobin A1c (HbA1c) were measured to assess diabetic control of the patients. The study concluded that, of the 200 people for whom ABI was measured, 22 (11%) had values less than 0.9.

STUDIES RELATED TO EFFECTIVENESS OF BUERGER - ALLEN EXERCISE

Jemcy John and A. Rathiga (2015) has conducted the study is to investigate the level of lower extremity perfusion among patient with type 2 diabetes and assess the effect of Buerger-Allen Exercise to improve lower extremity perfusion among patients with type 2 Diabetes Mellitus admitted at tertiary hospital, India. Non equivalent pre test post test control group design was followed to conduct the present study; divided 60 patients with type 2 diabetes mellitus admitted in chettinad hospital and research institute were grouped in to two groups. Subjects in experimental group were undergone intervention of Buerger - Allen exercise under supervision for 2 times a day for 5 days and in control group, subjects were under regular treatment. Demographic data and ankle brachial index scale was used to assess the lower extremity blood circulation. In experimental and control group 24(80%), 15 (50%) had lower extremity arterial disease and 6(20%), 15 (50%) were in border line. In experimental group there was a significant difference between the pre-test mean value 0.922 with SD 0.0562 and post test mean value 0.980 with SD .0407 which projects that t value 9.108* was significant at the level of $p<0.05$. The study concluded that Buerger -Allen exercise to be effective on improving the lower extremity.

M. Vijayabarathi, V. Hemavathy (2014) has conducted the study was evaluating the effectiveness of Buerger Allen exercise on wound healing process among Type 2 Diabetic foot ulcer patients. Quasi experimental pre test post test control design was adopted and Non probability purposive sampling technique was used to select the samples. A total of 60 Type 2 diabetes mellitus patient with foot ulcer has been taken from Rajiv Gandhi Government General Hospital, Chennai, and the Buerger Allen exercise was practiced for the selected samples. Condition of the

foot ulcer was analyzed before and after the study. Collected data was analyzedusing descriptive and inferential statistics. A high significant on an average, in experimental group, diabetic patients are having 24.6 % improved wound healing where as in control group, on an average, diabetic patients are having only 5.3 % wound healing. The study concluded that Buerger Allen exercise are effective in wound healing process among diabetes mellitus patients.

Dr. Thomas Rittenhouse (2011) study has conducted to find out the influence of foot perfusion in diabetes exercise. Exercise has both positive and negative effect on post exercise tissue perfusion on the lower limb with peripheral vascular disease. The aim of the study was to measure changes in foot perfusion following a brief period of lower limb exercise in individuals with and without type 2 DM and non critical PVD. The study was conducted among 61 patients. The result shows that post exercise, toe pressure and toe brachial pressure (TBI) increased in non -diabetic patient. But there was elevated transcutaneous oxygen tension (TcPO2) value in diabetic patient and decreased transcutaneous carbon dioxide (TcPCO2) decreased in all arterial disease. The study was concluded that the improvement in the TcPO2and decreased TcPCO2 level in foot site in diabetes shows changes in cutaneous blood supply. The researcher concluded that brief exercise results in an improvement as cutaneous perfusion in non critical PVD particularly patient with type 2 DM.

Xenakis (2009) A study has conducted to determine the cost effectiveness of exercise training to improve claudication symptoms in peripheral arterial disease. The aim of the study was to prove effectiveness of the exercise rehabilitation for the treatment of intermittent claudication, the primary symptom of PVD. The study was conducted comparing percutaneous transluminal angioplasty (PTA) and exercise rehabilitation. The effectiveness was assessed three and six months exercise programme. Initially first three months PTA was more effective than exercise rehabilitation but after six months the researcher found that the exercise was more

effective than PTA and cost effective also. The study concluded that exercise rehabilitation for claudication treatment has national implication for future PVD care.

Errold Petrofsky (2006) has conducted a clinical experimental study conducted to find out the effectiveness of Buerger Allen exercise among peripheral vascular disease patients. The study conducted among 13 patients admitted in hospital setting at Italy. The study evidenced increased perfusion after doing the exercise (pretest capillary refill (2-3sec) and post test capillary refill (1-2sec) and extremity pulses increased 10%in 50%of total population .the overall benefit seen in 7 patients after 24 hours evidenced by (increased perfusion and activity). The study concluded that Buerger Allen exercise is effective for improving lower extremity perfusion.

Wen – Chun (2006) has conducted an experimental study conducted among 25 peripheral vascular disease patients to determine effectiveness of exercise training to improve the symptoms of peripheral vascular disease at Chennai. The study results showed that 18%of population increased the activity and perfusion by reducing the symptoms. 4%of population illustrated a delayed effect to exercise and 2%showed improvement with surgery. The study concluded exercises are effective in reducing peripheral vascular disease symptoms.

Haghani (2002) has conducted an experimental study conducted to assess the effectiveness of Buerger Allen exercise on improving lower extremity perfusion among diabetic clients admitted in selected hospital at Bangalore. The researcher adopted quasi experimental design with purposive sampling on a sample size of 50.The result showed 75%of the type 2 diabetic patient improved peripheral perfusion after the exercise and 10% showed faster wound healing in diabetic ulcers and study concluded exercise is effective in improving extremity perfusion among type 2 DM clients.

CHAPTER-III

METHODOLOGY

Methodology is defined as the part of the research proposal usually consist of subjects, procedures and data analysis. (**Polit2004**).

This chapter descries the methodology of the effectiveness of Buerger -Allen exercise among diabetes mellitus patients in selected hospitals of Kanyakumari district.

It includes the research design, setting, variables, population, sample size, sampling technique, criteria for sample selection, description of the tool, content validity, pilot study and reliability of the tool, data collection procedure plan for data analysis.

RESEARCH APPROACH

Research approach as a general set of orderly discipline procedure used to acquire information. **Polit & Hangler (2004).**

An quantitative experimental approach was used to determine the effectiveness of Buerger-Allen exercise.

RESEARCH DESIGN

Research design is the plan and strategy of investigation of answering the research question. It is the overall plan or blue print were the researches select to carry out this study. (**Polit 2004**)

The research design adapted for this study was Quasi experimental pre test and post test control group design.

Group	Pre-test	Intervention	Post test
Experimental group	E_1	X	E_2
Control group	C_1	-	C_2

Table: 3.1 Schematic representation of research design

E_1 - Pre-test, assessment of peripheral circulation among diabetes mellitus patient in experimental group.

X- Intervention (Buerger - Allen Exercise)

E_2- Post test assessment of peripheral circulation among diabetes mellitus patient in experimental group.

C_1- Pre test assessment of Peripheral circulation among diabetes mellitus patient in Control group.

C_2- Post test assessment of Peripheral circulation among diabetes mellitus patient in Control group.

RESEARCH VARIABLE

Polit and Hungler, (2004) defined an attribute of a person or object that varies, that is, takes on different values.

Dependent Variable

Polit and Hungler (2004) defined dependant variables as "The variable hypothesized to depend on or be caused by another variable (the independent variable) the outcome variable of interest".

The present study dependent variable was peripheral circulation.

Independent Variable

Polit and Hungler (2004) defined independent variables as "The variable that is believed to cause or influence the dependent variable; in experimental research, the manipulated (treatment) variable".

The present study independent variable Buerger-Allen exercise

Extraneous Variables

Polit and Hungler (2004) defined extraneous variables as "A variable that confounds the relationship between the independent and dependent variables and that needs to be controlled either in the research design or through statistical procedures".

The present study extraneous variables were age, sex, Educational status, types of activities and duration of illness.

SETTING OF RESEARCH

Setting is physical locations and condition in which the data collection takes place. **(Polit 2011)**.

The settings for this study is Dominic hospital, Kulasekharam.

STUDY POPULATION

Population is the total number of people, who met the criteria that the researcher h established for a study from subject is will be selected and with whom findings will be generalized.**(Polit 2005)**

Accessible Population

Patients who were diagnosed as diabetes mellitus.

Target population

Diabetes mellitus with erythema, numbness, tingling and adema.

SAMPLE

Diabetes mellitus patients with erythema, numbness, tingling, edema and who are 50 years of age and above.

SAMPLE SIZE

The sample size was 60 patients among them 30 samples were in the experimental group and 30 samples were in the control group.

SAMPLE TECHNIQUES

Sampling is a process of selecting a portion of the designated population to represent the entire population.**(polit 2008).**

Purposive sampling technique was used for this study.

CRITERIA FOR SAMPLE SELECTION

Inclusion criteria

- 50 years of age and above.
- Those who are willing to participate. .
- The patients those who are having numbness, tingling and edema in lower extremities.

Exclusion criteria

- The patients who are critically ill.
- The patients who are having foot ulcer and gangrene.

DESCRIPTION OF THE TOOL

The tool was developed after the extensive review of literature, and experts advice. It was decided that the modified 60 seconds diabetes foot screen tool could be an appropriate tool to assess the peripheral circulation.

FORMAT OF THE TOOL

Part A

This section consists of demographic variables to collect information regarding age, gender, food pattern, Educational status and duration of illness.

Part B

Modified 60 seconds diabetic foot screen tool.

TESTING OF TOOLS

Validity

Validity of the tool was established by 7 experts including 5 nursing experts and 2 consultants of medical expert .The experts were requested to give their opinion and suggestion for further modification of items to improve the clarity and content of the items. The final tool was prepared as per the suggestions and advices given by the experts.

Reliability

The reliability of tool was estimated by using Test-Reset method which measures the co-efficient of internal consistency. The reliability co-efficient was calculated by Karl-Pearson's correlation co-efficient formula represented by the symbol "r". There liability value of the tool is 0.97 and hence the tool was found to be highly reliable

PILOT STUDY

A small scale version of the actual study conducted with the purpose of testing and potentially, refining the research plan some time called an exploratory study. **(Polit 2009)**

The pilot study was done after obtaining formal approval from director of Parasala government Hospital. The investigator introduced herself to the study samples and established good rapport. Then the investigator gave a short introduction about her study and the Buerger-Allen exercise. The pre-test level of peripheral circulation was assessed by using modified 60 seconds diabetic foot screening scale. The samples were selected using the purposive sampling technique. Based on inclusion criteria, six samples were selected. Three samples were allotted for experimental group and three samples were allotted for control group. Buerger-

Allen exercise was provided five times per a day for five days. The post test level of peripheral circulation was evaluated for both groups using modified 60 seconds diabetic foot screen scale.

DATA COLLECTION PROCEDURE

After obtaining formal written approval from the Dean of the Dominic Hospital, Kulasekharam, the investigator proceeded with the data collection.

The study was conducted at Dominic Hospital from 24-09-2015 to 25-10-2015. Introduction about investigator was given to samples. The investigator established good rapport with the diabetes mellitus patient, and assured that information would be kept confidential. The samples were selected by purposive sampling technique. Modified 60 seconds diabetic foot screen scale used for assess the effectiveness of Buerger-Allen exercise.

Based on inclusion criteria, sixty samples were selected from Dominic hospital for experimental group and control group. The pre test was conducted based on Modified 60 seconds diabetic foot screen scale to experimental and control group. Then the investigator applied Buerger-Allen exercise 5 times a day to the experimental group. Intervention was not given for control group. The time taken by the researcher to complete the intervention for every sample was 5 days. After intervention investigator, based on Modified 60 seconds diabetic foot screen scale, Post test was conducted for experimental group and control group.

PLAN FOR ANALYSIS

The researcher analyzed and the result was arranged in tabulate form to present the finding of the study in simple manner.

Descriptive statistics:

- Frequency and percentage distribution was used to analyze the demographic variables.
- Mean and standard deviation was used to evaluate the effectiveness of Buerger-Allen exercise.

Inferential statistics

Paired "t" test was used to determine the difference between pre and post test in term of effectiveness of Buerger - Allen exercise.

Chi- square was used to determine the association between selected variables.

PROTECTION OF HUMAN RIGHTS

The investigator got permission from the Global College of Nursing and also from the Dean of Dominic Hospital. The investigator explained the research process to the administrative personals.

Oral consent was obtained from each samples before starting data collection. The study fulfills all the ethical consideration. Assurance was given that the confidentiality about the data of the samples and maintained.

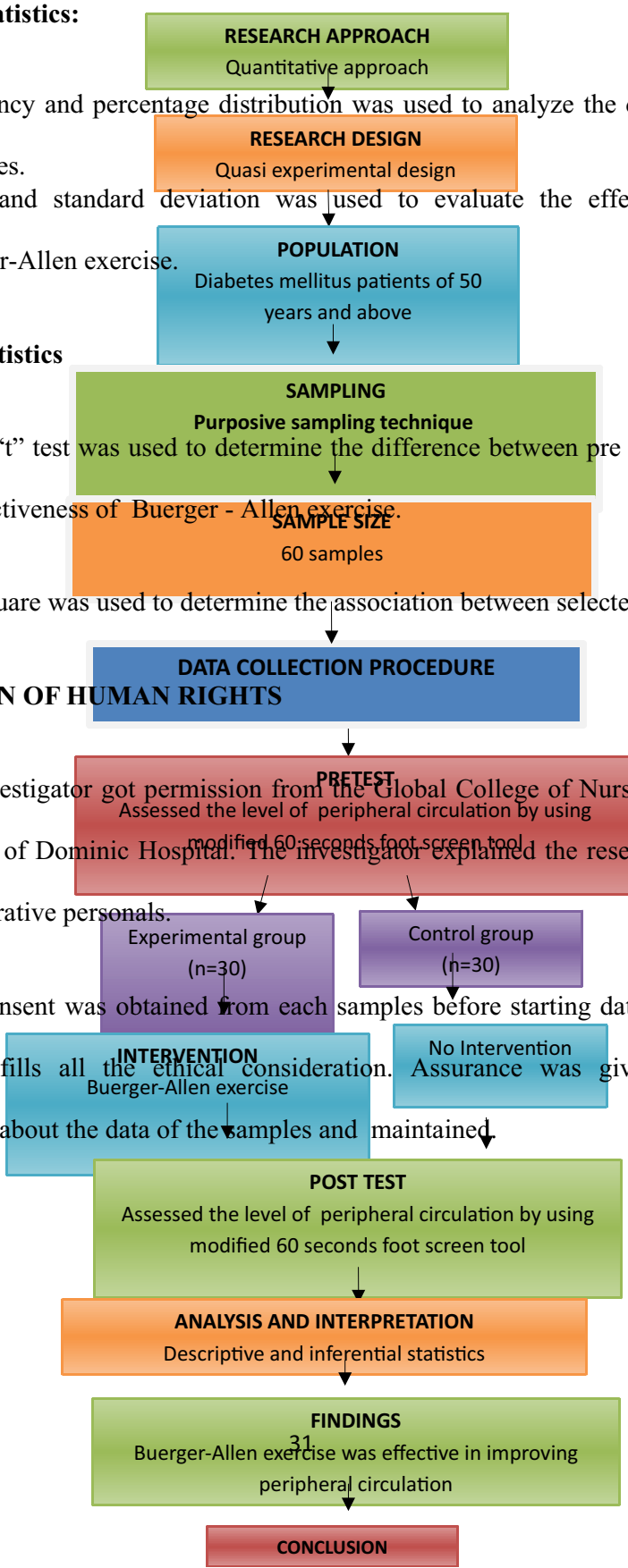


Figure 3.1: Schematic representation of research methodology

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

According to **Polit and Hungler (2005)** analysis is the method of organizing, sorting and scrutinizing data in such a way that research question can be answered. Research data must be processed and analyzed in an orderly fashion so that patterns and relationship can be discerned and validated, and hypotheses can be tested. Quantitative data analyzed through statistical analysis includes simple procedures as well as complex and sophisticated methods.

This chapter deal with the analysis and interpretation of the data collected from diabetes mellitus patient. The interpretation of tabulated data can bring to light the real meaning of findings of the study. In order to find meaningful answers to the research questions the collected data must be processed and analyzed in some orderly coherent fashion, so that patterns and relationships can be discerned. In this study the data was analyzed based on the objectives and hypotheses of the study using descriptive and inferential statistics.

PRESENTATION OF DATA

This chapter is divided into four sections,

Section-A: Frequency and percentage distribution of the sample according to the demographic variables in Experimental group and Control group.

Section-B: I. Distribution of sample in Experimental group and Control group among Diabetes Mellitus patient before intervention.

II. Distribution of sample in Experimental group and Control group among Diabetes Mellitus patient after intervention.

Section-C: I. Comparison of pre test and post test level of peripheral circulation

among Diabetes Mellitus patient in Experimental group and Control group.

II. Comparison of post test level of peripheral circulation among diabetes mellitus patient in Experimental group and Control group.

Section-D: I .Association between the pre test level of peripheral circulation among Diabetes Mellitus patients in Experimental group and control group with their demographic variables.

SECTION - A

DISTRIBUTION OF THE SAMPLE ACCORDING TO THE DEMOGRAPHIC VARIABLES IN EXPERIMENTAL GROUP AND CONTROL GROUP

(N = 60)

Sl.No	Demographic variables	Experimental group n=30		Control Group n=30	
		F	%	F	%
1.	**Age**				
	a. 50-55 years	8	26.67	7	23.33
	b. 55-60 years	6	20.00	5	16.67
	c. 60-65 years	7	23.33	8	26.67
	d. Above 65 years	9	30.33	10	33.33
2.	**Gender**				
	a. Male	16	53.33	17	56.67
	b. Female	14	46.67	13	43.33
Sl.No	**Demographic variables**	**Experimental group n=30**		**Control Group n=30**	
		F	**%**	**F**	**%**
3	**Educational status**				

	a. Illiterate	0	0.00	0	0.00
	b. Primary				
	c. Secondary	8	26.66	9	30.00
	d. Graduates				
		11	36.67	12	40.00
		11	36.67	9	30.00
4	**Food pattern**				
	a. Vegetarian	0	0.00	0	0.00
	b. Non vegetarian				
		30	100.00	30	100.00
5.	**Type of activities**				
	a. Sedentary worker	16	53.33	14	46.67
	b. Moderate worker				
	c. Heavy worker	10	33.33	11	36.67
		4	13.34	5	16.66
6.	**Duration illness**				
	a. Recently diagnosed	5	16.66	4	13.34
	b. 1 year				
	c. 5 years	8	26.67	9	30.00
	d. More than five years				
		8	26.67	7	23.33
		9	30.00	10	33.33

Table.4.1: Frequency and percentage distribution of demographic variables among diabetes mellitus patient with respect to age, gender, Educational status, Food pattern, Type of activities, Duration of illness in Experimental group and Control group.

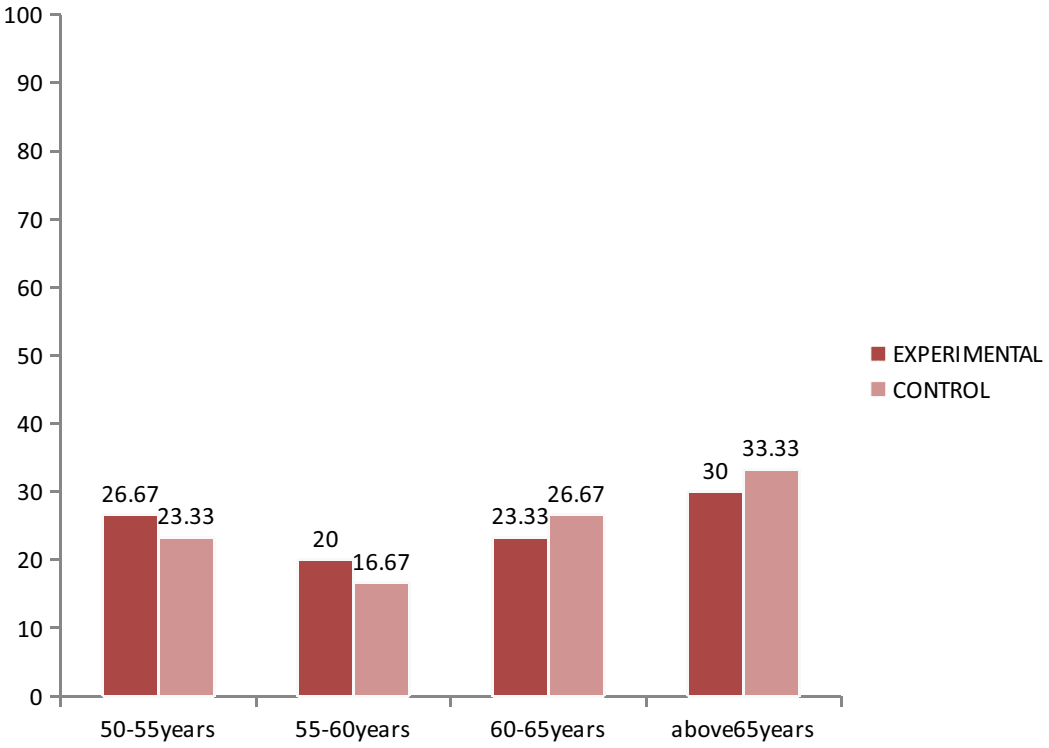


Fig.4.1 Percentage distribution of samples according to their age

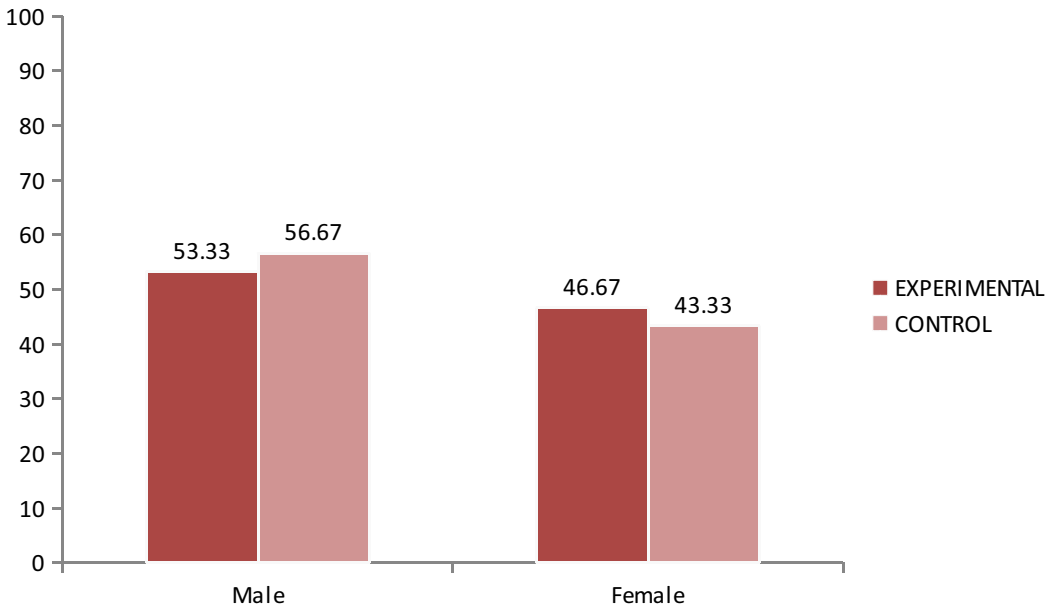


Fig.4.2 Percentage distribution of samples according to their gender

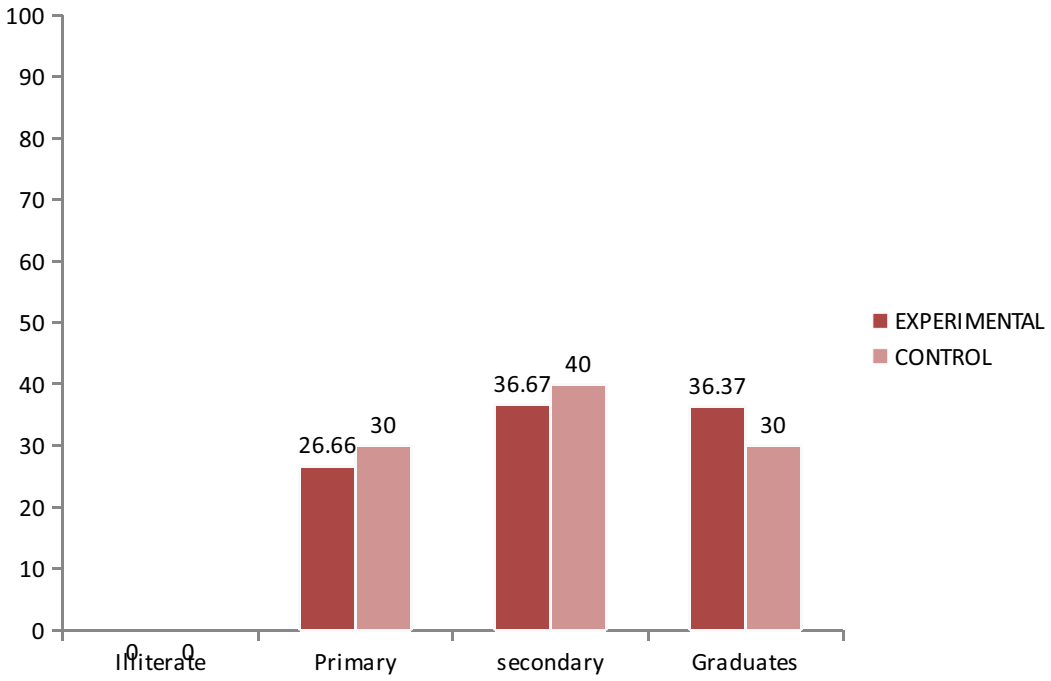


Fig.4.3 Percentage distribution of samples according to their educational status

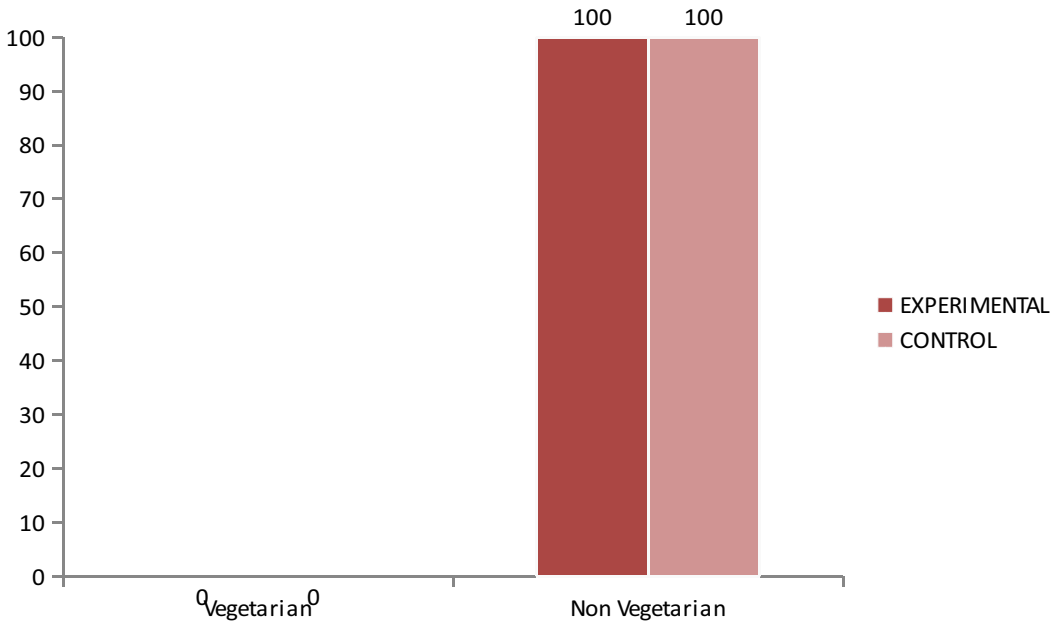


Fig.4.4 Percentage distribution of samples according to their food pattern

Fig.4.5 Percentage distribution of samples according to their type of activities

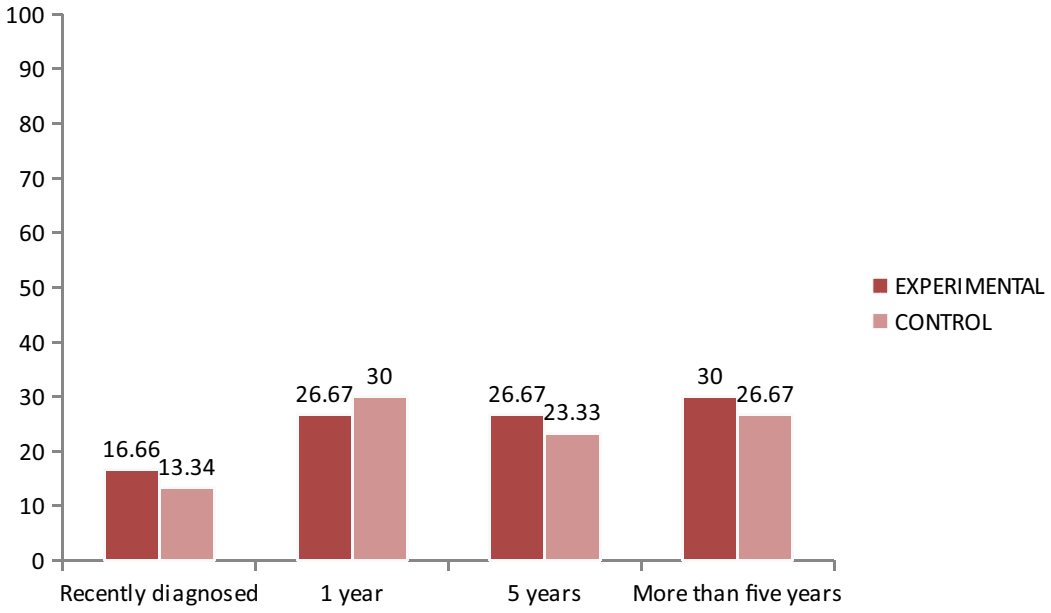


Fig.4.6 Percentage distribution of samples according to their duration of illness

Table 4.1 shows the distribution of sample according to the age in Experimental group, out of 30 sample8(26.67%) were 50-55 years of age, 6(20.00%) of them were 55-60 years of age, 7 (23.33%) were 60-65 years of age, 7 (23.33%) were above 65 years of age, and in control group7(23.33%) were 50-55 years of age, 5(16.67%) of them were55-60 years of age, 8 (26.67%) were 60-65 years of age,10(33.33) were above 65 years.

Table 4.2 Dispersion of sample according to the gender in the experimental group out of 30 sample 16(53.33%) were male, 14(46.67%) were female, and in control group 17(56.67%) were male, 13(43.33%) were female.

Table 4.3 Scattering of sample according to the educational status in the experimental group out of 30 sample 0(0.00%) belonged to Illiterate, 8(26.66%) belonged to Primary, 11(36.67%) belonged to Secondary and 11(36.67%)belonged to Graduates and in Control group 0(0.00%) belonged to Illiterate, 9(30.00%)belonged to Primary, 12(40.00%) belonged to Secondaryand9(30.00%)belonged to Graduates.

Table 4.4 With the respect to Food pattern in the experimental group out of 30 sample 0(0.00%) were Vegetarian, 30 (100.00%) were Non Vegetarian, and in control group 0(0.00%) were Vegetarian, 30(100.00%) were Non Vegetarian.

Table 4.5 With the respect to Type of activities in the experimental group out of 30 sample 16(53.33%) were Sedentary worker, 10(33.33%) were Moderate worker, 4(13.34%) were Heavy worker and in control group 14(46.67%) were Sedentary worker, 11(36.67%) were Moderate worker, 5(16.66%) were Heavy worker.

Table 4.6 With the respect to Duration of illness in the experimental group out of 30 samples,5(16.66%)were recently diagnosed. 8(26.67%) were 1 year, 8(26.67%) were 5 years, 9(30.00%) were More than five years and in control group 4(13.34) were recently diagnosed,9(30)were one year,7(23.33)were five years,10(33.33)were more than five years

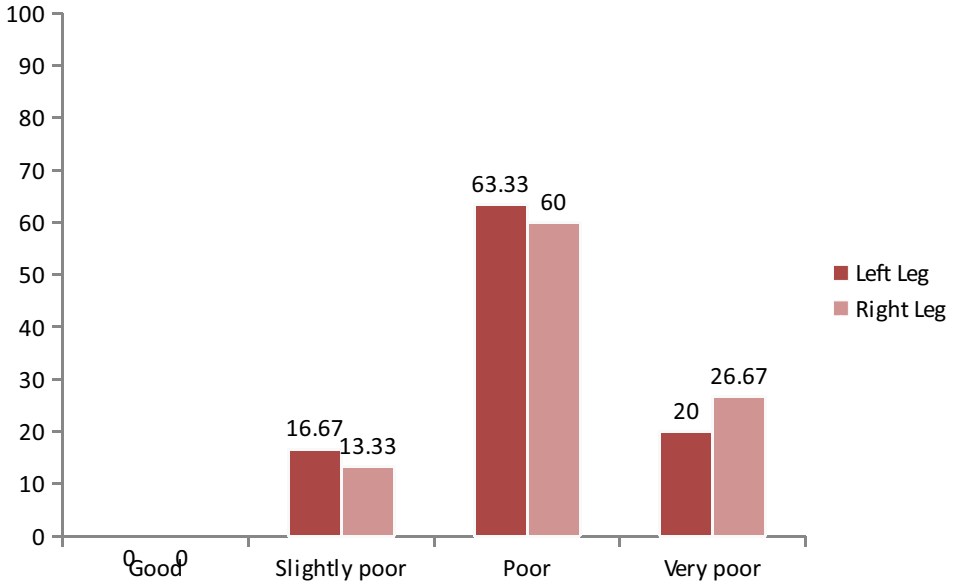
SECTION-B

I. DISTRIBUTION OF SAMPLEIN EXPERIMENTAL GROUP AND CONTROL GROUP AMONG DIABETES MELLITUS PATIENT IN BEFORE INTERVENTION

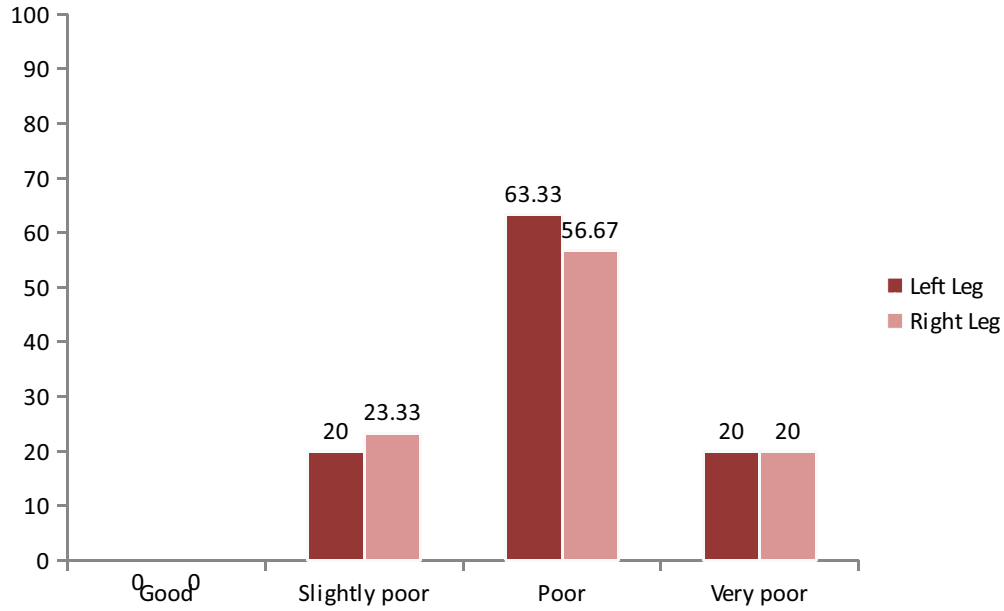
N=60

S. No	Level of Blood circulation	Pre test							
		Experimental group n=30				Control group n=30			
		Left Leg		Right Leg		Left Leg		Right Leg	
		f	%	f	%	f	%	f	%
1.	Good	0	0.00	0	0.00	0	0.00	0	0.00
2.	Slightly poor	5	16.67	4	13.33	6	20.00	5	16.67
3.	Poor	19	63.33	18	60.00	18	60.00	19	63.33
4.	Very poor	6	20.00	8	26.67	6	20.00	6	20.00

Table-4.2: Frequency and percentage distribution of diabetes mellitus patient according to the pre test level of peripheral circulation in Experimental group and Control group.



Experimental group



Control group

Fig -4.7: Frequency and percentage distribution of diabetes mellitus patient according to the pre test level of peripheral circulation in Experimental group and Control group.

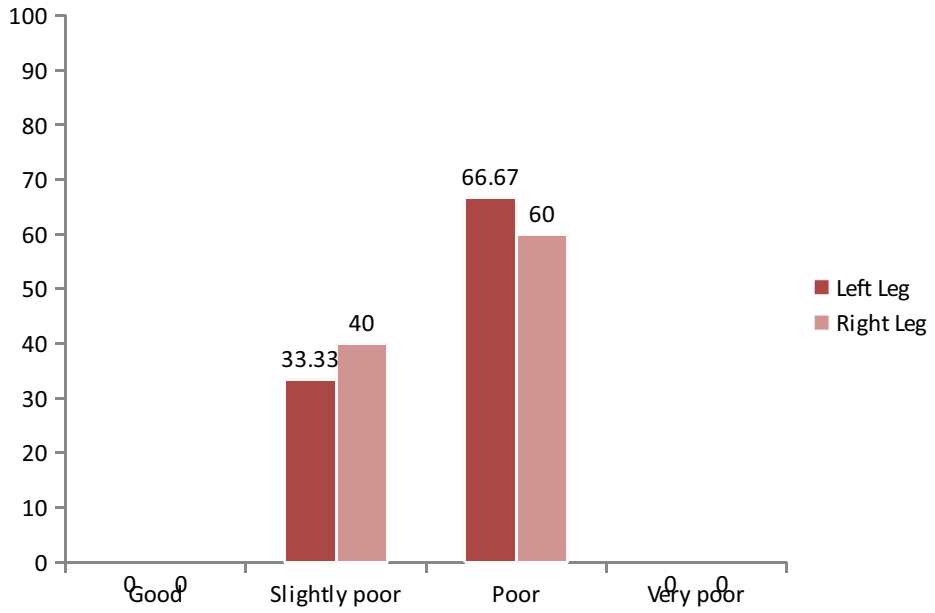
Fig 4.7 shows during pretest, in Experimental group of left leg 0(0.00%) had Good blood circulation, 5(16.67%) had Slightly poor blood circulation, 19(63.33%) had Poor blood circulation, 6(20.00%) had Very Poor blood circulation. In Experimental group of right leg 0(0.00%) had Good blood circulation, 4(13.33%) had Slightly poor blood circulation, 18(60.00%) had Poor blood circulation, 8(26.67%) had Very Poor blood circulation. In Control group of left leg, 0(0%) had Good blood circulation, 6(20%) had Slightly poor blood circulation, 18(60%) had Poor blood circulation, 6(20%) had Very Poor blood circulation. In Control group of right leg, 0(0%) had Good blood circulation, 5(16.67%) had Slightly poor blood circulation, 19(63.33%) had Poor blood circulation, 6(20%) had Very Poor blood circulation.

II. DISTRIBUTION OF SAMPLE IN EXPERIMENTAL AND CONTROL GROUP AMONG DIABETES MELLITUS PATIENT IN AFTER INTERVENTION

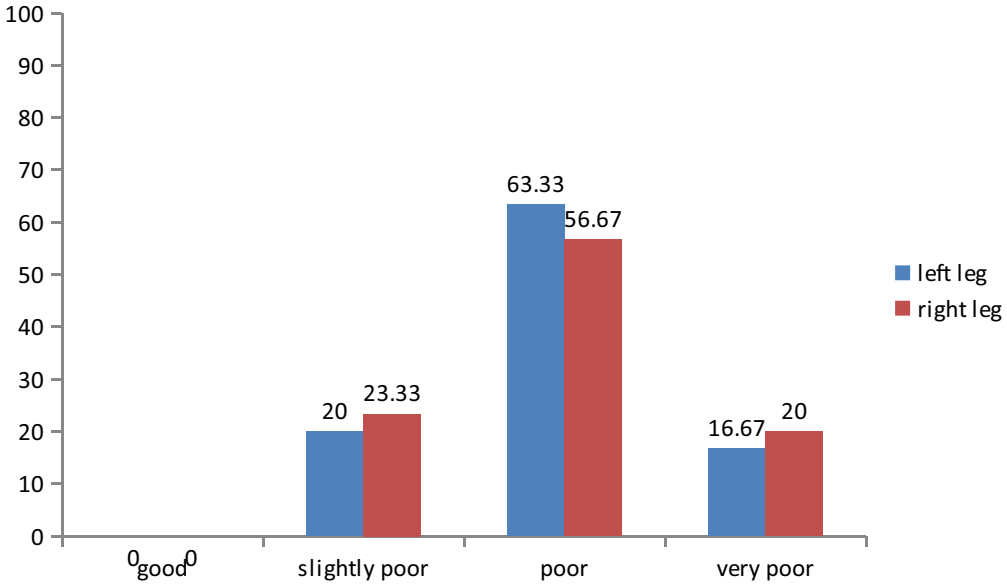
N =60

S. No	Level of Blood circulation	Post test							
		Experimental group n=30				Control group n=30			
		Left leg		Right leg		Left leg		Right leg	
		f	%	f	%	f	%	f	%
1.	Good	0	0.00	0	0.00	0	0.00	0	0.00
2.	Slightly poor	10	33.33	12	40.00	6	20.00	7	23.33
3.	Poor	20	66.67	18	60.00	19	63.33	17	56.67
4.	Very poor	0	0.00	0	0.00	5	16.67	6	20.00

Table-4.3: Frequency and percentage distribution of diabetes mellitus patient according to the post test level peripheral circulation in Experimental group and Control group.



Experimental group



Control group

Fig-4.8: Frequency and percentage distribution of diabetes mellitus patient according to the post test level of peripheral circulation in Experimental group and Control group.

Fig 4.8 shows during posttest, in Experimental group of left leg 0(0.00%) had Good blood circulation, 10(33.33%) had Slightly poor blood circulation, 20 (66.67%) had Poor blood circulation, 0(0.00%) had Very Poor blood circulation. In Experimental group of right leg 0(0.00%) had Good blood circulation, 12(40.00%) had Slightly poor blood circulation, 18(60.00%) had Poor blood circulation, 0(0.00%) had Very Poor blood circulation. In Control group of left leg, 0 (0%) had Good blood circulation, 6(20%) had Slightly poor blood circulation, 19 (63.33%) had Poor blood circulation, 5(16.67%) had Very Poor blood circulation. In Control group of right leg, 0(0%) had Good blood circulation, 7(23.33%) had Slightly poor blood circulation, 17(66.67%) had Poor blood circulation, 6(20%) had Very Poor blood circulation.

SECTION-C

I. COMPARISON OF PRE TEST AND POST TEST LEVEL OF PERIPHERAL CIRCULATION AMONG DIABETESMELLITUS PATIENTIN EXPERIMENTAL GROUPAND CONTROL GROUP

N=60

S. No	Group	Legs	Pre test		Post test		Mean difference	df	Paired 't' value
			Mean	SD	Mean	SD			
1.	Experimental	Left	16.56	3.40	13.13	3.35	3.43	2	9.35
	group	Right	17.06	3.15	13.00	2.98	4.06	2	12.51
2.	Control group	Left	16.36	3.35	15.20	3.30	1.16	2	5.5
		Right	16.56	3.13	15.36	3.66	1.20	2	4.39

Table value t=2.04, * Significant at p > 0.05 level.

Table-4.4: Mean, SD and paired 't' value on pre and post test level of peripheral circulation among diabetes mellitus patients in Experimental group and Control group

Table-4.4 represents, the mean score of diabetics mellitus patient in Experimental group of left leg was 16.56 in pre test and 13.33 in post test. The paired 't' value was 9.35***** which is significant at p >0.05 and right leg was 17.06 in pre test and 13.00 in post test. The paired 't' value was 12.51***** which is significant at p >0.05. It shows that Buerger - Allen exercise in improving was effective in improving peripheral Circulation. Hence the research hypothesis (H_1) is accepted.

In Control group the mean score of left leg was 16.36 in pre test and 15.20 in post test. The paired 't' value was 5.5***** which is significant at p >0.05 and right leg was 16.56 in pre test and 15.36 in post test. The paired 't' value was 4.39***** which is significant at p >0.05. It shows that Buerger - Allen exercise in improving was effective in improving Venus Circulation. Hence the research hypothesis (H_1) is accepted.

II. COMPARISON OF POST TEST LEVEL OF PERIPHERAL CIRCULATION AMONG DIABETES MELLITUS PATIENTIN EXPERIMENTAL GROUP AND CONTROL GROUP.

N=60

S. No	Group	Legs	Post test Mean	Post test SD	Mean difference	df	Un paired 't' value
1.	Experimental group	Left	13.13	3.35	2.07	58	2.75
		Right	13.00	2.98			
2.	Control group	Left	15.20	3.30	2.36	58	2.91
		Right	15.36	3.66			

Table value t=1.691, * Significant at p > 0.05 level.

Table-4.5 Mean, SD and unpaired 't' value on level of peripheral circulation among diabetes mellitus patient in Experimental group and Control group after intervention.

Table-4.5 represents, the mean score of diabetics mellitus patient in Experimental group of left leg was 13.13 in post test and 15.20 in Control group post test. The estimated' value was 2.75* which is significant at p > 0.05. The mean score of diabetics mellitus patient in Experimental group of right leg was 13.00in post test and 15.36 in Control group post test. The estimated' value was 2.91* which is significant at p > 0.05.It shows that Buerger - Allen exercise in improving was effective in improving peripheral Circulation. Hence the research hypothesis (H_1) is accepted.

SECTION:D

ASSOCIATION BETWEEN THE PRE TEST LEVEL OF PERIPHERAL CIRCULATION AMONG DIABETIES MELLITUS PATIENT IN EXPERIMENTAL GROUP AND CONTROL GROUP WITH THEIR DEMOGRAPHIC VARIABLES

S. No	Demographic Variables	n=30 Experimental Group					n=30 Control Group				
		F	x^2 Left Leg	x^2 Right Leg	df	T	F	x^2 Left Leg	x^2 Right Leg	df	T
1	**Age**										
	a. 50-55 Yrs b. 55-60 Yrs c. 60-65 yrs d. above65 yrs	8 6 7 9	6.03	6.43	3	7.82	7 5 8 10	9.35	7.63	3	7.82
2	**Gender**										
	a. Male	16	1.2	1.56	1	3.84	11	1.1	1.68	1	3.84
	b. Female	14					13				
3	**Educational status**	0					0				
	a. Illiterate	8	3.36	2.97	3	7.82	9	2.7	3.51	3	7.82
	b. Primary	11					12				
	c. Secondary	11					29				
	d. Graduates										

S. No	Demographic Variables	Experimental Group					Control Group				
		F	x^2		df	T	F	x^2		df	T
			Left Leg	Right Leg				Left Leg	Right Leg		
	Food Pattern										
4	a) Vegetarian	0	0	0	1	3.84	0	0	0	1	3.84
	b) Non Vegetarian	30					0				
5	**Type of activities**										
	a. Secondary worker	16					14				
	b. Moderate worker	10	10.46	26.72	2	5.99	11	13.56	10.72	2	5.99
	c. Heavy worker	4					5				
6	**Duration of illness**										
	▪ Recently diagnosed	5					4				
	▪ 1 year	8	45.3	35.29	3	7.82	9	34.80	35.73	3	7.82
	▪ 5 years	8					7				
	▪ More than five years	9					1				

Table 4.6 Association between the pre test level of Peripheral Circulation among diabetes mellitus patient in experimental and control group selected with their demographic variables

Table-4.6 shows that in experimental group of left leg, on considering the age, chi-square value was 6.03 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.22 and the table at degrees of freedom one was 3.81. Educational status shows chi-square value of 3.36 and table value of 7.82 at degrees of freedom three. In food pattern chi-square was 0 and the table value was 3.81. at degrees of freedom one. Type of activity shows chi-square was 10.46 and table value was 5.99 at the degree of freedom two. Duration of illness shows that chi-square value was 35.3 and table value 7.82 at the degrees of freedom three.

In experimental group of right leg, on considering the age, chi-square value was 6.43 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.56 and the table at degrees of freedom one was 3.81. Educational status shows chi-square value of 2.97 and table value of 7.82 at degrees of freedom three. In food pattern chi-square was 0and the table value was 3.81 at degrees of freedom one. Type of activity shows chi-square was 26.72 and table value was 5.99 at the degree of freedom two. Duration of illness shows that chi-square value was 35.29 and table value 7.82 at the degrees of freedom

In control group of left leg, on considering the age, chi-square value was 9.35 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.11 and the table at degrees of freedom one was 3.84. Educational status shows chi-square value of 2.78 and table value of 7.82 at degrees of freedom three. In food pattern chi-square was 0and the table value was 3.81 at degrees of freedom one. Type of activity shows chi-square was 13.56 and table value was 5.99 at the degree of freedom two. Duration of illness shows that chi-square value was 34.80 and table value 7.82 at the degrees of freedom three.

In control group of right leg, on considering the age, chi-square value was 9.63 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.68 and the table at degrees of freedom one was 3.84. Educational status shows chi-square value of 3.51and table value of 7.82 at degrees of freedom three. In food pattern chi-square was 0 and the table value was 3.81 at degrees of freedom 1.type of activity shows chi-square was 10.72 and table value was 5.99 at the degree of freedom two. Duration of illness shows that chi-square value was 35.73 and table value 7.82 at the degrees of freedom three.

Table-4.6 It reveals that, there is significant association ($p > 0.05$) between the improving peripheral circulation and demographic variables of diabetes mellitus patients in experimental and control group. Hence the research H_2 accepted

CHAPTER-V

DISCUSSION

This chapter deals with the discussion of the data analyzed based on the objective and hypothesis of the study. The problem stated was an A study to evaluate effectiveness of Buerger-Allen exercise in improving the peripheral circulation among clients with diabetes mellitus in selected hospitals at Kanyakumari district. The discussion was based on the objectives of the study and the hypothesis mentioned in the study.

OBJECTIVES

- To assess the pre test and post test level of peripheral circulation among diabetes mellitus patient in experimental and control group.
- To compare the post test level of peripheral circulation among diabetes mellitus patient between experimental and control group.
- To associate the pre test level of peripheral circulation among diabetes mellitus patient in experimental group with their selected demographic variables.

DISTRIBUTION OF SAMPLES ACCORDING TO THEIR DEMOGRAPHIC VARIABLE

- The distribution of sample according to the age in Experimental group, out of 30 sample8(26.67%) were 50-55 years of age, 6(20.00%) of them were 55-60 years of age, 7 (23.33%) were 60-65 years of age, 7 (23.33%) were above 65

years of age, and in control group7(23.33%) were 50-55 years of age, 5(16.67%) of them were55-60 years of age, 8(26.67%) were 60-65 years of age,10(33.33) were above 65 years.

- Dispersion of sample according to the gender in the experimental group out of 30 sample 16(53.33%) were male, 14(46.67%) were female, and in control group 17(56.67%) were male, 13(43.33%) were female.
- Scattering of sample according to the educational status in the experimental group out of 30 samples 0(0.00%0 belonged to illiterate, 8(26.66%) belonged to primary,11(36.67%)belonged to Secondary and 11(36.67%) belonged to Graduates and in Control group 0(0.00%) belonged to Illiterate, 9(30.00%)belonged to Primary, 12(40.00%) belonged to Secondary and9(30.00%)belonged to Graduates.
- With the respect to Food pattern in the experimental group out of 30 sample 0(0.00%) were Vegetarian, 30 (100.00%) were Non Vegetarian, and in control group 0(0.00%) were Vegetarian, 30(100.00%) were Non Vegetarian.
- With the respect to Type of activities in the experimental group out of 30 sample 16(53.33%) were Sedentary worker,10(33.33%) were Moderate worker, 4(13.34%) were Heavy worker and in control group 14(46.67%) were Sedentary worker, 11(36.67%) were Moderate worker, 5(16.66%) were Heavy worker.
- With the respect to Duration of illness in the experimental group out of 30samples,5(16.66%)were recently diagnosed. 8(26.67%) were 1 year, 8(26.67%)were 5 years, 9(30.00%) were More than five years and in control group4(13.34)were recently diagnosed,9(30)were one year,7(23.33)were fiveyears,10(33.33)were more than five years.

THE FIRST OBJECTIVE WAS TO ASSESS THE PRE AND POST TEST LEVEL OF PERIPHERAL CIRCULATION AMON DIABETES MELITUS PATIENT IN EXPERIMENTAL GROUP AND CONTROL GROUP

During pre test, in Experimental group of left leg 0(0.00%) had Good blood circulation, 5(16.67%) had Slightly poor blood circulation, 19(63.33%) had Poor blood circulation, 6(20.00%) had Very Poor blood circulation. In Experimental group of right leg 0(0.00%) had Good blood circulation, 4(13.33%) had Slightly poor blood circulation, 18(60.00%) had Poor blood circulation, 8(26.67%) had Very Poor blood circulation. In Control group of left leg, 0(0%) had Good blood circulation, 6(20%) had Slightly poor blood circulation, 18(60%) had Poor blood circulation, 6(20%) had Very Poor blood circulation. In Control group of right leg, 0(0%) had Good blood circulation, 5(16.67%) had Slightly poor blood circulation, 19(63.33%) had Poor blood circulation, 6(20%) had Very Poor blood circulation.

During post test, in Experimental group of left leg 0(0.00%) had Good blood circulation, 10(33.33) had Slightly poor blood circulation, 20(66.67%) had Poor blood circulation, 0(0.00%) had Very Poor blood circulation. In Experimental group of right leg 0(0.00%) had Good blood circulation, 12(40.00%) had Slightly poor blood circulation, 18(60.00%) had Poor blood circulation, 0(0.00%) had Very Poor blood circulation. In Control group of left leg, 0(0%) had Good blood circulation, 6(20%) had Slightly poor blood circulation, 19(63.33%) had Poor blood circulation, 5(16.67%) had Very Poor blood circulation. In Control group of right leg, 0(0%) had Good blood circulation, 7(23.33%) had Slightly poor blood circulation, 17(66.67%) had Poor blood circulation, 6(20%) had Very Poor blood circulation.

Chang Gunga University (2015) has conducted to find out the effectiveness of Buerger- Allen exercise among peripheral disease patients. The study conducted among 13 patients admitted in hospital setting at Italy. The study evidenced increased perfusion after doing the exercise (pretest capillary refill (2-3sec) and post test

capillary refill (1-2sec) and extremity pulses increased 10%in 50%of total population .the overall benefit seen in 7 patients after 24 hours evidenced by (increased perfusion and activity). The study concluded that Buerger-Allen exercise is effective for improving lower extremity perfusion.

THE SECOND OBJECTIVE WAS TO COMPARE THE POST TEST LEVEL OF PERIPHERAL CIRCULATION AMONG DIABETES MELLITUS PATIENT BETWEEN EXPERIMENTAL AND CONTROL GROUP

The mean score of diabetes mellitus patient in Experimental group of left leg was 16.56 in pre test and 13.33 in post test. The paired 't' value was 9.35***** which is significant at p >0.05 and right leg was 17.06 in pre test and 13.00 in post test. The paired 't' value was 12.51***** which is significant at p >0.05. It shows that Buerger-Allen exercise in improving was effective in improving Peripheral Circulation. Hence the research hypothesis (H_1) is accepted.

In Control group the mean score of diabetes mellitus patient in Experimental group of left leg was 16.36 in pre test and 15.20 in post test. The paired 't' value was 5.5***** which is significant at p >0.05 and right leg was 16.56 in pre test and 15.36 in post test. The paired 't' value was 4.39***** which is significant at p >0.05. It shows that Buerger-Allen exercise in improving was effective in improving peripheral Circulation. Hence the research hypothesis (H_1) is accepted.

The mean score of diabetes mellitus patient in Experimental group of left leg was 13.13 in post test and 15.20 in Control group post test. The estimated' value was 2.75* which is significant at p > 0.05. The mean score of diabetes mellitus patient in Experimental group of right leg was 15.20 in post test and 15.36 in Control group post

test. The estimated' value was 2.36* which is significant at p > 0.05.It shows that Buerger - Allen exercise in improving was effective in improving Venus Circulation. Hence the research hypothesis (H_2) is accepted.

K.BJerre-Jepsen(2004) showed that Buerger-Allen exercise improved the peripheral circulation of lower extremity, Individuals with diabetes mellitus have a two to fourfold increase in the rate of peripheral arterial disease. Non equivalent pre test post test control group design was followed to conduct the present study; divided 60 patients with type 2 diabetes mellitus admitted in Chettinad Hospital and research institute were grouped in to two groups. Subjects in experimental group were undergone intervention of Buerger-Allen exercise under supervision for 2 times a day for 5 days and in control group, subjects were under regular treatment. In experimental and control group 24(80%), 15 (50%) had lower extremity arterial disease and 6(20%), 15 (50%) were in border line. In experimental group there was a significant difference between the pre-test mean value 0.922 with SD 0.0562 and post test mean value 0.980 with SD .0407 which projects that t value 9.108* was significant at the level of $p<0.05$. The findings of the present study revealed that here is a significant improvement in the lower extremity perfusion after doing Buerger Allen exercise .Buerger-Allen exercise was found to be effective on improving the peripheral circulation of lower extremity among patients with type 2 diabetes mellitus.

THE THIRD OBJECTIVE WAS TO FIND OUT ASSOCIATION BETWEEN PRE TEST LEVELS OF PERIPHERAL CIRCULATION AMONG DIABETES MELITUS PATIENT IN EXPERIMENTAL GROUP AND CONTROL GROUP WITH THEIR SELECTED DEMOGRAPHIC VARIABLES

In experimental group of left leg, on considering the age, chi-square value was 6.03 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.22 and the table at degrees of freedom one was 3.81. Educational status shows chi-square value of 3.36 and table value of 7.82 at degrees of freedom three. in food pattern chi-square was 0 and the table value was 3.81. At degrees of freedom one.Type of activity shows chi-square was 10.46 and table value was 5.99 at the degree of freedom two.Duration of illness shows that chi-square value was 35.3 and table value 7.82 at the degrees of freedom three.

In experimental group of right leg, on considering the age, chi-square value was 6.43 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.56 and the table at degrees of freedom one was 3.81. Educational status shows chi-square value of 2.97 and table value of 7.82 at degrees of freedom three. In food pattern chi-square was 0and the table value was 3.81 at degrees of freedom one. Type of activity shows chi-square was 26.72 and table value was 5.99 at the degree of freedom two. Duration of illness shows that chi-square value was 35.29 and table value 7.82 at the degrees of freedom three.

In control group of left leg, on considering the age, chi-square value was 9.35 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.11 and the table at degrees of freedom one was 3.84. Educational status shows chi-square value of 2.78 and table value of 7.82 at degrees of freedom three. in food pattern chi-square was 0and the table value was 3.81 at degrees of freedom one. Type of activity shows chi-square was 13.56 and table value was 5.99 at the degree of freedom two. Duration of illness shows that chi-square value was 34.80 and table value 7.82 at the degrees of freedom three.

In control group of right leg, on considering the age, chi-square value was 9.63 and the table value at degrees of freedom three was 7.82. As per the gender, the chi-square was 1.68 and the table at degrees of freedom one was 3.84. Educational status shows chi-square value of 3.51and table value of 7.82 at degrees of freedom three. In food pattern chi-square was 0 and the table value was 3.81 at degrees of freedom one. Type of activity shows chi-square was 10.72 and table value was 5.99 at the degree of freedom two. Duration of illness shows that chi-square value was 35.73 and table value 7.82 at the degrees of freedom three.

Findings

There is a significant association between the pre test level of burger- Allen exercise among diabetes mellitus patients in experimental group and control group with their demographic variables such as age, gender, educational status, food pattern, types of activity and duration of illness.

CHAPTER VI

SUMMARY, CONCLUSION, LIMITATIONS, NURSING IMPLICATION AND RECOMMENDATIONS

This chapter deals with the summary of the study, conclusion drawn, nursing implications, limitations and recommendations of the study.

SUMMARY

A quasi experimental pre test and post test control group design was chosen for this study. The conceptual frame was based on the J.W. Kenny's general system model. Purposive sampling technique was used for this study. Samples were selected based up on the inclusion and exclusion criteria 60 samples were selected for this study.30 samples were selected to the experimental group and 30 samples were selected to the control group.

The tool used to correct the data consists of two part. part one was demographic variables and the part two was functional food assessment scale. the data were collected and analyzed using descriptive and inferential statistics. the level of significance was assessed by $p>0.05$ to test the hypotheses.

FINDINGS

During post test, in Experimental group of left leg 0(0.00%) had Good blood circulation, 10(33.33%) had Slightly poor blood circulation, 20(66.67%) had Poor blood circulation, 0(0.00%) had Very Poor blood circulation. In Experimental group of right leg 0(0.00%) had Good blood circulation, 12(40.00%) had Slightly poor blood circulation, 18(60.00%) had Poor blood circulation, 0(0.00%) had Very Poor blood circulation. In Control group of left leg, 0(0%) had Good blood circulation, 6(20%) had Slightly poor blood circulation, 19(63.33%) had Poor blood circulation, 5(16.67%) had Very Poor blood circulation. In Control group of right leg, 0(0%) had

Good blood circulation, 7(23.33%) had Slightly poor blood circulation, 17(66.67%) had Poor blood circulation, 6(20%) had Very Poor blood circulation.

It revealed that among experimental group diabetics mellitus patient in the mean score of left leg was 16.56 in pre test and 13.33 in post test. The paired 't' value was 9.35* which is significant at p >0.05 and right leg was 17.06 in pre test and 13.00 in post test. The paired 't' value was 12.51* which is significant at p >0.05. It shows that Buerger- Allen exercise was effective in improving Venus Circulation.

CONCLUSION

The following conclusion was drawn to the study. the study proved that Buerger -Allen exercise helped to improve the peripheral circulation among diabetes mellitus patient.

IMPLICATIONS

The researcher has derived the following implications from the study results which are of vital concern to the field of nursing service, nursing administration, nursing education and nursing research.

Implications for Nursing Practiced

- Buerger -Allen exercise can be introduced as a stimulating mode of intervention by the nurses for promoting peripheral circulation among the patients suffering from varicose vein.

- Buerger-Allen exercise can be incorporated into routine nursing intervention.

- Buerger-Allen can be given for patients admitted in medical ward. This exercise will help to reduce the circulatory complication among diabetes mellitus patient.

Implications for Nursing Education

- Nurse educator can encourage students to conduct health teaching sessions on various exercise methods.

- Staff development program need to be arranged, so that the nurse educators can encourage the students to provide various exercise to the patients.

Implications for Nursing Administration

- Nursing administrator can organize in-service education programmes for staff nurses regarding Buerger- Allen exercise.

- Nurse administrator can make arrangements for the practice of Buerger-Allen exercise in hospital, so that the staff nurses can provide calm, quiet, clean and safe environment to the patients for the practice.

Implications for nursing research

- Researchers should focus on other non-pharmacological interventions to improve the peripheral circulation.

- A study can be conducted with large sample.

- ❖ The findings should be disseminated through conferences, seminars and publications in professional, national and international journals.

LIMITATIONS

Since there were very few studies done on the effectiveness of Buergr -Allen exercise in improving peripheral circulation among diabetes mellitus selected hospital. It was difficulty in collecting the study materials for the review.

RECOMMENDATIONS

1. A similar study could be conducted with varicose vein disease patients to find out the effectiveness of the peripheral circulation exercise.
2. A comparative study can be to evaluate the effectiveness Buerger -Allen exercise between the diabetes mellitus patient and varicose vein.
3. A study can be conducted with large sample size to generalize the results of the study.
4. Research can be conducted to find out the various innovative methods to improve the level of peripheral circulation.
5. Research can be done on various populations at various settings.

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APPENDIX -I

DOMINIC HOSPITAL

CARDIAC & DIABETIC CARE CENTRE

KULASEKHARAM, KANYAKUMARI DISTRICT - 629 161.

Email:dominichospital@yahoo.com.

Dr. T. DOMINIC, MBBS., MD., (Medicine) Physician & Diabetologist

Dr. P. JEYA SINGH, MD., DM., Physician & Cardiologist

☎ : 04651-277488
280388

Date : 24/10/2015

To

The Principal ,

Global College of Nursing,

Nattalam – 629165,

K.K.Dist.

Sir,

Sub : Permission for M.Sc., Nursing Project – Regarding.

We are glad to inform that we approved permission to your college student **Mrs.A. Abishal, II year M.Sc (Nursing),** to undergo project on "**A study to evaluate the effectiveness of burger – allen exercise in improving the peripheral circulation among clients with diabetes mellitus in Dominic hospital at Kanyakumri District"** in our hospital from 24-09-2015 to 24-10-2015. She did this project under the care of **Dr. Dominic MD.** We trust that your student will abide our hospital rules and regulation.

Thanking You

Administrative officer

Dr. T. DOMINIC, M.D.,
PHYSICIAN & DIABETOLOGIST
Reg. No: 27851.
DOMINIC HOSPITAL
KULASEKHARAM - 629 161

APENDIX - II

Reg. No. : L-27876

Cell : 9443301096
9488901096

S.M. PHYSIOTHERAPY CENTRE

Near Rajive Junction,
Thenkapattanam Road, Karungal - 629157,
Kanyakumari Dist.

Physiotherapist :-
Dr. M. Sebas Godson *MPT(Ortho), MIAP, D.Acu, DMT*
Dr. Miracle S. Godson *BPT*

Date : .....

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mrs. Abishal, II year MSc Nursing, Global College of Nursing, Nattalam has undergone training in Buerger-Allen Exercise under my guidance from 01.08.2015 to 30.08.2015. During the period of training she was attentive and understood various techniques to the needed extent.

I wish her all success in future.

Signature and Seal

S.M. PHYSIOTHERAPY CLINIC
Dr. M. Sebas Godson
MPT(Ortho) MIAP, D.Acu.DMT
(Physiotherapist)
Reg. No. L-27876
KARUNGAL - 629 157

APPENDIX - III

LETTER SEEKING EXPERTS OPINION FOR VALIDITY OF TOOL

From

A. Abishal,

M.Sc (Nursing) II year,

Global College of Nursing,

Nattalam.

To

Respected Sir / Madam,

I am doing II M.Sc Nursing in Global College of Nursing Nattalam. As a partial fulfillment of the course, I have chosen a topic of my interest **"A study to evaluate the effectiveness of Buerger – Allen exercise in improving the peripheral circulation among diabetes mellitus patient in selected hospital at Kanyakumari District".** I have prepared demographic data and standardized tool. I hereby kindly request you to evaluate the tool based on the evaluation criteria. Your opinion and suggestion will help me to the successful completion of my study.

Thanking you,

Yours Truly,

APPENDIX-IV

EVALUATION CRITERIA CHECK LIST FOR VALIDATION

INTRODUCTION

The expert is requested to go through the following criteria for evaluation.

Three columns are given for responses and a column for remarks. Kindly place tick mark in the appropriate column and give remarks.

Interpretation of column

Column I: Meets the criteria

Column II: Partially meet the criteria

Column III: Does not meet the criteria

Serial No	Criteria	1	2	3	Remarks
1	Scoring -Adequacy -Clarity -Simplicity				
2	Content -Logical sequence - Adequacy -Relevance				
3	Language -Appropriate -Clarity -Simplicity				
4	Practability -It is easy to score Does it precisely Utility				

Signature: Any other suggestion

Name:

Designation:

Address:

APPENDIX - V

LIST OF EXPERTS VALIDATED THE TOOL

1. **Dr. Dominic, M.D.,**
   Physician &Diabetologist,
   Dominic Hospital,
   Kulasekharam.

2. **Mrs. S.S. SharmilaJansi Rani, M.Sc (N)., Phd,**
   Professor,
   Christian College of Nursing,
   Neyyoor.
3. **B. BrightricJoliyo, M.Sc (Nursing),**
   Professor,
   White Memorial College of Nursing,
   Attoor.
4. **Mrs. VinithaBai, M.Sc (Nursing,**
   Reader,
   Christian College of Nursing,
   Marthandam.
5. **Mrs. Merlin SujaM.Sc (Nursing)**
   Reader,
   Christian College of Nursing,
   Marthandam.

APPENDIX –VI.A

DEMOGRAPHIC VARIABLES

Sample Number : …….

1. Age
   a. 50 years
   b. 51-55 years
   c. 56-60 years
   d. Above 60

2. Gender
   a. Male
   b. Female

3. Educational Status
   a. Illiterate
   b. Primary
   c. Secondary
   d. Graduates

4. Food pattern
   a. Vegetarian
   b. Non Vegetarian

5. Type of activities

a. Sedentary worker
b. Moderate worker
c. Heavy worker

6. Duration of illness
   a. Recently diagnosed
   b. 1 year
   c. 5 years
   d. More than five years

APPENDIX – VI.B

CONTENT	SCORE	
	LEFT FOOT	RIGHT FOOT
1. Skin 0 = intact and healthy 1 = dry with fungus are light callus 2 = heavy callus build up 3 = open ulceration are history of previous ulcer		
2. Nails 0 = well kept 1 = unkempt and ragged 2 = thick, damaged, or infected		

3. Deformity 0 = no deformity 1 = mild deformity 2 = major deformity		
4. Edema 0 = no edema 1 = mild edema 2 = severe edema		
5. Temperature - Cold 0 = Foot warm 1 = foot is cold		
CONTENT	**SCORE**	
	LEFT FOOT	**RIGHT FOOT**
6. Temperature – Hot 0 = Foot is warm 1 = foot is hot		
7. Range of motion 0 = full range of hallux 1 = hallux limitus 2 = hallux rigidus 3 = hallux amputstion		
8. Sensation – monofilament testing 0 = 10 sites detected 2 = 7-9 sites detected 4= 0-6 sites detected		
9. Sensation – Ask 4 questions Are your feet ever numb? Do they ever tingle? Do they ever burn? Do they ever feel like insects are crawling on them? 0=no to all question		

2= yes to any of the question		
10. Pedal pulses 0 = Present 1 = Absent		
11. Dependent Rubor 0 = no 1 = yes		
12. Erythema 0 = no 1 = yes		
Score Totals =		

Scoring

Score=0 to 6-good blood circulation

Score=7 to 12- slightly poor blood circulation

Score=13 to 19- poor blood circulation

Score= 20 to 25-very poor blood circulation

APPENDIX – VI.C

INTERVENTION OF BUERGER – ALLEN EXERCISE

Buerger-Allen Exercise

Buerger- Allen exercise is an active postural exercise, which help in filling and empting the lower extremity blood vessels according to gravity alternatives. Its having 3 steps of activity that includes elevation, dependency and horizontal.

Usually the exercises are prescribed for about 12 -13 minutes. Three series of steps can be repeated for a frequency of 4 times a day.

Step I — Elevation

The lower extremities are elevated to a 45 to90 degree angle and supported in this position until the skin blanches, for about 2 to 3 minutes.

Step 2 – Dependency

The feet and legs are then lowered below the level of the rest of the body until redness appears (care should be taken that there is no pressure against the back of the knees); for about *3-5* minutes.

Step 3 - Horizontal

The legs are placed flat on the bed in a horizontal position for 3-5 minutes. The length of time for each position varies with the patient's tolerance and the speed with which color change occurs.